

ABSTRACT OF THE DISCLOSURE

A method of passivating the surface of a substrate to protect the surface against corrosion, the surface effects on a vacuum environment, or both. The substrate surface is placed in a treatment environment and is first dehydrated and then the environment is evacuated. A silicon hydride gas is introduced into the treatment environment, which may be heated prior to the introduction of the gas. The substrate and silicon hydride gas contained therein are heated, if the treatment environment was not already heated prior to the introduction of the gas and pressurized to decompose the gas. A layer of silicon is deposited on the substrate surface. The duration of the silicon depositing step is controlled to prevent the formation of silicon dust in the treatment environment. The substrate is then cooled and held at a cooled temperature to optimize surface conditions for subsequent depositions, and the treatment environment is purged with an inert gas to remove the silicon hydride gas. The substrate is cycled through the silicon depositing step until the surface of the substrate is covered with a layer of silicon. The treatment environment is then evacuated and the substrate cooled to room temperature.